The Papilionidæ of South Australia.

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Plates II. and III.

In a paper entitled "Insects of South Australia," published in the Transactions of the Royal Society for 1878-9, thirteen genera of Papilionidæ (including *Synemon*) with twenty-six species were mentioned as then known to me. Since then four species of *Hesperilla* have been added, presenting a total of only thirty for so large and varied an area as the Counties of Adelaide, Sturt, Barossa, Light, and Ferguson present; though it is not assumed that there may not exist others in such parts as the author has not visited. Coloured figures of specimens, mostly in my possession (or were so) have been submitted to the Hon. W. McLeay, Sydney, who identified the majority as previously described, but was not certain whether the others were new or not.

The object of this paper is to present as complete a list as I can of the family, with short notes and short descriptions of those deemed new.

The scarcity of Papilionidæ in respect of number of genera and species over so large an area is very striking. The causes are principally two:—The great dryness generally during their season of flight, with occasional severe droughts, by means of which their reproduction is much interfered by; and, destructive bush-fires, which destroy them and their food-plants wholesale over square miles of waste land.

The sombreness of their general coloration is also as remarkable. Brick-red, various shades of brown, white, and black are the most frequently occurring tints among the larger species; yellow (except in one species) and orange appear in patches; blue only in small dots (except in Lycænidæ). The cause for this seems to be that this particular coloration, agreeing with the prevailing tints of their surroundings, affords the insects efficient protection. Thus brick-red and brown tints prevail in those species principally that habitually fly near the ground composed of red clays, &c.,

where they settle when pursued. Frequently I have had to examine the spot carefully for some minutes, upon which one of these butterflies had been seen to settle, before its whereabouts could be discovered. Another instance of such corelation is, that in the earlier part of the season brighter and duller coloured individuals of the same species appear indiscriminately; but later on, only the latter are about, which seems to prove that they were better protected. The white and black tinted species blend harmoniously with the profuse white clusters of the Eucalypti flowers, which they frequent. The yellow *Terias* and the bluish species of *Cupido* fly chiefly close to the ground, and frequent preferentially flowers of their own hue; for the former several yellow-flowered composits, for the latter the blue *Wahlenbergia gracilis*, *Dampiera rosmarinifolia*, &c., which are very abundant. When resting upon such flowers they are almost wholly concealed by the blending of their colours, and this, no doubt, contributes considerably to their safety from birds, &c. The Papilionidæ occur much more frequently where there is surface-water or moisture in the soil, than where such is not the case. Thus, they are much more abundant in the gullies of wooded ranges than in the dry shrubless plains; and along the sea-coast of Yorke's Peninsula far more are met with than a mile or two inland. In fact, during a walk for miles in the mallee scrub, at the best part of the season, one can scarcely ever catch a glimpse of any. During the hot north-west winds, I have frequently found them collected in numbers in hollow trees, under overhanging stones, or other shady places, which afford them some protection against the fierce blasts—some as lively as ever, some already so weak as scarcely to be able to rise or move, while some actually have succumbed to the heat.

Papilio Erithonius, Cramer.

Ref.—Angas, S. Aust. Illustrated, pl. 37, fig. 1.

This is the largest and one of the rarest of our butterflies. It measures $3\frac{5}{8}$ to $3\frac{3}{4}$ inches in span, is black with a broad yellow band contiguous through the middle of both pairs of wings, a series of yellow spots along their whole margin, two red spots partly surrounded by a blue ring on the opposite sides of the posterior wings, while all the darker parts of both pairs are dotted over with innumerable blue specks, form its principal distinction. It flies usually high, frequenting the flowers of the higher Eucalypts for their nectar, but sometimes descends to lower levels when attracted by the profuse blooming of lower trees and shrubs (*Bursaria spinosa* and *Melaleuca* species). I have captured it in the open glades of the Barossa hills. Reedbeds, near Adelaide (*Angas*).

Pieris Aganippe, Donovan.

Ref.—Insects of New Holland, t. 29, 1805. Prod. Zool. Victoria I., t. 10.

This species occurs in the Barossa hills, often in great numbers in spring and early summer. It seems to be especially attracted by *Myoporum* sp., which grows into tall shrubs near the summits of the hills, over and around which scores have been observed at the same time. I have taken it occasionally on Yorke's Peninsula. Kangaroo Island (*Boisduval*).

Pieris Harpalyce, Donovan.

Pl. III., fig. 4.

Ref.—Ins. New Holl., t. 18, f. 1. Prod. Zool. Vict. I., t. 9.

A species, to which the name is doubtfully applicable, occurs with *P. Aganippe* in the Barossa hills, and has similar habits to it.

Pieris Argenthona, Fabr.

Ref.—Angas, S. Aust. Illus., t. 37, f. 2.

Hab.—Vicinity of the Lakes and the Coorong (*Angas*).

Pieris Teutonia, Fabr.

Ref.—Donovan, Ins. New Holland. t. 17, f. 1.

Has been captured at Nuriootpa, Co. Light, feeding on the flowers of *Eucalyptus odorata*, but is not of frequent occurrence.

Terias Smilax, Donovan.

Pl. III., fig. 7.

Ref.—Ins. New Holl., t. 20, f. 3; Angas, S. Aust. Illust., t. 37, f. 6.

This butterfly is citron yellow, with the tips of the anterior wings dark brown, 1¼ inches in span. The underside is uniformly pale yellow without any other mark. It flies low, and only frequents grassy spots in October and November. It was very numerous years ago near Lyndoch, Co. Adelaide, but rather rare now, and it has been noticed occasionally at Ardrossan, Y.P.

Pyrameis Itea, Fabr.

Ref.—Donovan, Insects New Holl., t. 26, f. 1; Angas, S. Aust. Illust., t. 37, f. 4.

This species has frequently been mistaken for the European "red admiral" by superficial observers. The base of its anterior and the larger part of its posterior wings are dark reddish-brown; a broad light-yellow band nearly crosses the middle of the former, beyond which they are deeply black excepting three small yellow spots. A narrow black band seams the posteriors, margined yellowish-white; near the edge of the brown are four small "eye" spots, with blue in the centre.

The span of the female is $2\frac{3}{16}$ inches; the male is considerably smaller. In the whole it is rare, but on one occasion I saw dozens at Salt Creek, Monarto, Co. Sturt, which forms a rocky gully with permanent waterholes surrounded with rushes (*Scirpus nodosus*). A few have been observed along the sea-coast of Yorke's Peninsula.

Pyrameis Cardui, Linné.
Pl. III., fig. 8.

Junonisa vellida, Fabr.

Ref.—Donovan, Insects N. Holl., t. 25, f. 3; Angas, S. Aust. Illust., t. 37, f. 5.

Xenica Klugii, Guerin.

Ref.—Zool. Voy. Coquille, t. 17, f. 2 (1829).

The last three species are the most numerous of the family, and are found from September to April or May flitting about everywhere, and in all parts of the province that I have visited. Their eggs are glued to stalks of grasses, and are hatched about June or July. It appears that they, in common with other lepidopters, have two hatching seasons in the year, the second being in February and March—at least in those months another flight of them takes place.

Heteronympha Merope, Fabr.

Ref.—Angas, S. Aust. Illust., t. 37, f. 3.

Is the second in size and the highest in colouring of the butterflies in the province. It seems to be rare, and I have not been able to learn anything about its transformation. Its principal colour is a light red or orange, the apical half of the anterior wings velvety-black, with two larger irregular yellow spots near the upper and lower side, and a smaller one in the middle near the margin, which is brown. A waved band of the chief colour, connected by a line along the central nerve with semi-lune joining the inner red field, completes the ornamentation of the first pair of wings. The posterior wings are margined with black; within the red field are three black zigzag lines, and a straight line along the middle nerve. An eye spot is near the middle of the lower edge. The insect has been captured at Lyndoch, Co. Adelaide, and seen at Ardrossan, Co. Ferguson.

Danais Chrysippus, Linné.

Has only been noticed in late years. Dr. Berge says its home is the Ionian Isles and the shores of the Mediterranean. It seems, therefore, to have been introduced, but how? when? and where? Yet undoubtedly it thrives in its new home. Several specimens were caught in my garden at Nuriootpa, Co.

Light. [*D. Erippus*, Cram., an allied species of American origin, is now common about Adelaide, and during the present winter has been noticed at Gawler.—Ed.]

Lycæna discifer, Herr. Schäff.

Pl. II., figs. 14, 15.

Ref.—Stett. Ent. Zeit. 1869, p. 72, t. 4, f. 21.

The two sexes of this species are distinguished by rather dissimilar colours, as are shown by fig. 14 male, and fig. 15 female. It frequents the flowers of low shrubs, &c., and has been observed at Nuriootpa, Co. Light, and at Ardrossan, Yorke's Peninsula, but nowhere numerously.

Cupido bœtica.

Pl. II., fig. 11.

This is one of our commonest species, and occurs in moderate numbers in all parts of the province visited by me. Its principal distinction, besides the pale blue and brownish-grey tint of the upper side of both wings, is a rather long silky appendage to the lower part of the posterior wings, which are also marked by two black spots in a white band near the margin. The most notable markings, on the under side, are a broad white band across both wings, two black eye spots right and left of the base of the appendage, bordered outwardly by a narrow semicircle of metallic blue, inwardly with yellow, and numerous narrow, but distinct, bands to the very base. The male is smaller, and marked less conspicuously than the female.

Cupido agricola, Doubleday et Hew.

Pl. II., fig. 8.

Ref.—Genera Diurnal Lepid., t. 76, f. 4.

Is also found in most localities. Its size is much less than *C. bœtica*, and its colour a uniform dark brown, margined with white and brown alternately.

Cupido œneus, *spec. nov.*

Pl. II., fig. 9.

This is one of the largest species of the genus in the province, and is not less than one and a half inches in span. The basal parts of the upper side of the wings are of a fine changing purplish-blue, the apex of the anterior and the edges of both wings of bright bronze colour; the margin of the anteriors is black, with white fringe; the posteriors have the inner corner deeply scalloped, and a small appendage attached, near to which two dark spots occur, edged with white, produced as a white line along the margin; fringe white. The under side is of delicate tan colour, the margin edged with a fine dark line. Two rows of small white ovals converge slightly from the lower

corner near margin. Three other similar rows occupy the space from the inner one mentioned first to the base along medial line. Two small velvety-black spots mark the lower corner near the margin of the under side of the posterior wings, which are also beset with numerous sub-concentric ring-bands similar to those of the anteriors. The male is a little smaller than the female, and its markings somewhat modified. A specimen of one in my possession shows a circular whitish spot on the left anterior wing, only, towards the middle of the margin. This species is also one of the commoner, and has been noticed in the Counties Adelaide and Light. The specific name refers to the colour of the wings.

Cupido simplexa, *spec. nov.*
Pl. II., fig. 10.

Is fully as large as the preceding species, but the blue extends over a larger portion of the wings, the remainder being a greyish-black, and no other marks present superiorly. The under side is of a delicate grey, with scarcely traceable darker tinted oval spots. The anterior wings show a larger and a smaller black spot, with indistinct outlines, near the lower corner. The specimen was captured at Monarto, Co. Sturt, frequenting open bushy parts in early summer. The name is in allusion to the plain colouring of the wings by comparison with *C. æneus.*

Cupido delicata, *spec. nov.*
Pl. II., fig. 12.

This *Cupido* is only slightly above one inch in span, the male even less. A most delicate light purplish-blue overspreads the greatest part of the wings, which are edged narrowly with a light grey; the thorax is bluish-black. The under side of all the wings is light grey, the fringe included, but edged with a fine dark line. A double row of small oval spots, brownish bordered with greyish-white, is near the margin of both pairs of wings, and a faint mark in the centre of the anteriors. Another row of dots, directed obliquely towards inner edge, and traces of a third nearer the base, mark the posterior wings, The male only has a small appendage, and a faint black spot near it. *C. delicata* has been captured at Nuriootpa. The specific name is given in reference to its delicate shading.

Cupido fasciola, *spec. nov.*
Pl. II., fig. 13.

The *C. fasciola* is smaller than the foregoing, and has been obtained from the same locality. The purplish-blue is disposed along the principal nerves, remainder dark bronze. The margin of the wings of the female is fringed with black and white

alternately; the lower corner of posteriors is scalloped and marked with three semi-lunar black spots (central one largest), inner edge of same bordered with white. The underside of all the wings is light brown, edged by a sharply defined dark line, succeeded by brown and white zigzag lines; the black spot above is reproduced below. Parallel but disjointed white lines, bordering dark brown spots, form an almost continuous band across both wings; another and similar set is nearer the base, and between them an oval spot of similar tints. The male is smaller and darker in hue, and without the black and white fringe of the female, which latter has the white much more abundantly arranged in patches and bands. The appellation refers to the numerous bands of the underside.

Cupido adamapuncta, *spec. nov.*
Pl. II., fig. 16.

This species is smaller still than the preceding, not quite seven-eighths of an inch in span, and occurs at the same locality. Its colour is a clear bronze brown, traces of the changing blue appearing only near the base of the wings and the upper side of the body; two lighter coloured spots near the outer edge mark the anterior wings, and two round black spots, near the margin at the inner corner, the posteriors. The underside is of a delicate tan colour, two rows of bead-like, brown and white coloured spots form a double band along the margin and a similar coloured bar near the centre mark the anterior wings, while the posterior ones present a succession of four or five similar bands, but fainter in tint. Two small eye spots opposite the black ones on the upper surface, but glittering like diamonds set upon black velvet, are the chief characteristic of this rare insect.

Cupido *(sp. indet.)*
Pl. II., fig. 3.

The Cupido sp., fig. 3, is the smallest in the province known to me, and occurs in the same locality as the former—all along the foot of the Barossa Ranges in bushy parts. It is of a pale blue and blackish-grey superiorly, the wings rather long and narrow. It is not numerous, and frequents flowers of *Bursaria spinosa*, and other shrubs in spring and summer.

Ogyris otanes, Felder.
Pl. III., fig. 1.

Ref.—Reise Novara, Lepidopt. II., p. 217, t. 28, f. 1-3, 1865.

Only the female of this species is represented by fig. 1, t. 3, as the male is of the same general colour and outline, but is about one-third smaller and devoid of the yellow spots on the anterior wings, which, however, in a somewhat modified

form, are reproduced on the underside. The underside, beside some convolute markings, presents a metallic blue eye spot, rather irregular. It has been principally captured in the scrubby sandhills, frequenting the flowers of *Bursaria spinosa*, *Calycothrix tetragona*, &c. Individuals closely resembling the males have been occasionally noticed in the scrubs near Ardrossan, Y.P., upon blooming *Melaleuca acuminata*, but as no females have been observed, the species or variety is uncertain.

Hesperilla bifasciata, *spec. nov.*
Pl. II., fig. 4.

This *Hesperilla* is known to me by one specimen only; it was captured near Lyndoch some fifteen years ago, and I have not been able to obtain another. Its colour is a clear brown, with four oval yellow spots near the margin, three near the base, and a semi-lunar one between them near the edge. A double band—the outer white, the inner yellow—margins the posterior wings, and a small round yellow spot is near their base.

Hesperilla trimaculata, *spec. nov.*
Pl. II., fig. 1.

This occurs in open grasslands at Monarto, County Sturt, and is figured from a specimen in my possession captured there. It is of about the same tint as the preceding, but a little larger, being $1\frac{5}{8}$ inches in span. The anterior wings are marked with three small yellow spots (that next the apex sometimes divided) forming a triangle; a narrow black bar from the lower edge upward halfway arross between the lower and the basal spot, and a small round black spot in the same direction as the bar near the upper edge. The underside is of a lighter hue; the innermost spot is reproduced, and so is that at the end of the black bar (next the margin), but extended downwards into a bar; the posterior wings have four white round spots surrounded by black; one, the larger, a little beyond the first-third of the distance from the base, the others a little beyond the middle from thence to the margin. Hairs of underside of body light yellow.

Hesperilla quadrimaculata, *spec. nov.*
Pl. II., fig. 2.

This species occurs at Ardrossan and Yorke Valley, Yorke's Peninsula, and is about the same size as the preceding. Its colour is a uniform blackish-brown, except the central and inner parts of the posterior wings, which are reddish with indistinct edges; three angular light yellow spots in a line equi-distant from the margin, and one at the apex of the central cell, mark the upper side of the anterior wings. The

under side is yellowish brown, the spots are reproduced, but that next the apex of the wing only as a minute dot. The posterior wings show three minute round black dots in a line, and encircled by black, a small round silver-white spot nearer the base. The upper part of the body is of the same tint as the wings, but rather darker; the hairs and scales on the underside pale to orange yellow in various shades. It flies in November.

Hesperilla atralba, *spec. nov.*

Pl. II., fig. 5.

This species, which occurs with the foregoing, is considerably smaller than it, and is almost black. Both pairs of wings are edged with a fine white line and fringe, separated by seven black spots in the first pair; the base of same is tinged brown; three rather large angular white spots, lightly tinged with a yellowish shade, are arranged in a semi-circular order, and form almost a band; between these and the apex are two similar ones, touching each other by one corner only. Near the middle of the posterior wings is a rather large oval greenish-yellow spot, and the part of the wings from it to the base is tinged lightly with the same hue. The underside of the anterior wings is also nearly black, the spots reproduced, an orange streak at the base along upper edge, the apex of wings grey, with indistinct darker marks. The underside of posterior wings is uniformly grey, with several transverse rows of faintly darker, irregular, ring-like marks. The upper part of the body is black, the lower grey. It flies low over the ground in grassy open places in the bush in March, and sips the juice of *Dampiera rosmarinifolia* and other low plants. The name is suggested by the coloration of the wings.

Hesperilla lutea, *spec. nov.*

Pl. II., fig. 6.

This is a small butterfly, with an expanse of wing of $1\frac{1}{4}$ inches. The prevailing colour of its upper side is blackish-brown; the narrow fringe is of dirty grey; the body black; the anterior wings show five small yellow spots, four of which are in a line nearly parallel with the margin, the fifth a little within near the upper edge; an indistinct large yellow spot near the middle marks the posterior pair. Underside of anterior wings blackish; the spots reproduced, except that next the apex; edge and apex dark yellow. The latter colour also tints the posterior wings, which have a small silver-white spot near the centre, surrounded by a fine black ring. The underside of the body is whitish-yellow. The figure is that of a male. It was captured in November at Ardrossan.

Hesperilla gracilis, *spec. nov.*
Pl. II., fig. 7.

This *Hesperilla* has been captured near Salisbury, Adelaide Plains, and is the smallest known to me. Its body is slender in proportion to its size; the thorax and head are black, the abdomen also, but the segments edged white. The upper side of the wings is of a uniform dark bronze brown; the anterior wings are marked with a white zigzag band near the margin, and a short white bar near the middle. The posterior wings are without any mark. The colour of the underside is much lighter; the anteriors marked with small white spots, the apical one being the reproduced end of superior band; the posterior wings are margined with black and white spots alternately; five white spots form an outer, one large and four minute ones a central, and one large and two small ones a basal band. The markings of the male are narrower than those of the female.

I append the genus *Synemon*, peculiar to Australia, to the Papilionidæ, although aware that it is placed by eminent entomologists among the Agaristidæ, because it appears to me that in the whole its species present in their appearance (as the venation of wings, the clubbed antennæ, their habit of flight, &c.) more affinity to the former than to the latter, and that the genus is a link that joins the Hesperidæ to the day-flying moths.

Synemon Theresa, Doubleday.

Ref.—Stokes, Discov. Austral. I., p. 517, pl. 3, fig. 6; Angas, S. Aust. Illus., t. 27, fig. 9; Butler, Illus. Lep. Het., p. 6, pl. 3, fig. 5.
Hab.—S. Australia (*Angas*).

Synemon mopsa, Doubleday.

Ref.—Stokes, Discov. Austral. I., p. 518, pl. 3, fig. 7; Butler, Illus. Lep. Het., p. 7, pl. 3, fig. 3.
Hab.—S. Australia (*Brit. Mus.*).

Synemon læta, Walker.
Pl. III., figs. 3*a*, 3*b*.

Ref.—Butler, Illus. Lep. Het., p. 6, pl. 3, fig. 4.
This is the commonest species of the genus, though nowhere numerous. The anterior wings are brown, thickly dotted with white specks, and darker and the markings more variable and indistinct. The posterior wings are black, with deep-red markings, viz., three spots near the margin, a zigzag band nearly across, a large irregular spot near the base. The bars and other markings are reproduced on the underside, but

coloured orange, which also speckles the brownish remainder. Examples have been captured or seen at Nuriootpa, Co. Light, Lyndoch, County Adelaide, and Ardrossan, Yorke's Peninsula, and fly low among the grass in November and December. The female measures a little above $1\frac{3}{4}$ inches in span; the male a little less. The body of the former is much attenuated, and extends beyond the lower edge of the wings; that of the latter is considerably shorter.

Synemon scaria, Felder.

Ref.—Reise Novara, Lepidoptera.

S. scaria is much smaller than *S. læta*, and is known to me in a female alone, taken in November at Ardrossan, Yorke's Peninsula. The upper side of the anterior wings is brown, with mottled whitish bands, enclosing darker spaces; that of the posteriors is scarlet, with an interrupted black band along margin, and two small irregular black spots in the middle; the base of both wings is yellowish-brown. The underside of both is chiefly orange coloured, the darker spots reproduced with indistinct outlines. The apex and fringe is grey.

Synemon obscura, *spec. nov.*

Pl. III., fig. .

This species is distinguished by its general dark colour and obscure markings, especially the reddish spots of the posterior wings. It was captured near Lyndoch, Barossa, County Adelaide.

The illustrations of this and the following species are copies of drawings taken by myself fifteen years ago, of specimens in a collection which has since been scattered. No other examples have come under my observation.

Synemon livida, *spec. nov.*

Pl. III., fig. .

Occurs with the last, from which it is distinguished by its livid grey colour and different markings. Blackish lines along the main nerves and edging the margin, and five spots in a row along same, distinguish the anterior wings; the posteriors present a black line along middle nerve, joining a narrow black transverse band, and between this and the margin four indistinct black dots; all the part below the black band is coloured orange. The figure represents a female.

This concludes the list of Papiloinidæ of South Australia as far as personally examined. Of the larger ones it is very probably exhaustive, but less so of the smaller species, which resemble each other so much superiorly. As it is, I hope the foregoing may be useful as a basis for a monograph of the species of the family inhabiting the province.

Explanation of Plates.

[All the figures are drawn to the natural size, and as viewed from above, excepting figs. 2, 5, 6, and 7, Plate II., which represent the upper and under sides. In the Society's Library copies of vol. iv. of the Transactions, these plates are coloured.]

Plate II.

Fig. 1. *Hesperilla trimaculata.*
Fig. 2. *Hesperilla quadrimaculata.*
Fig. 3. *Cupido* sp.
Fig. 4. *Hesperilla bifasciata.*
Fig. 5. *Hesperilla atralba.*
Fig. 6. *Hesperilla lutea;* a male.
Fig. 7. *Hesperilla gracilis.*
Fig. 8. *Cupido agricola.*
Fig. 9. *Cupido œneus.*
Fig. 10. *Cupido simplexa.*
Fig. 11. *Cupido bœtica.*
Fig. 12. *Cupido delicata.*
Fig. 13. *Cupido fasciola.*
Fig. 14. *Lycœna discifer;* a male.
Fig. 15. *Lycœna discifer;* a female.
Fig. 16. *Cupido adamapuncta.*

Plate III.

Fig. 1. *Ogyris otanes;* a female.
Fig. 2. *Synemon scaria;* a female.
Fig. 3*a*. *Synemon læta;* a female.
Fig. 3*b*. *Synemon læta;* a male.
Fig. 4. *Pieris Harpalyce.*
Fig. 5. *Synemon obscura.*
Fig. 6. *Synemon livida;* a female.
Fig. 7. *Terias Smilax.*
Fig. 8. *Pyrameis Cardui.*